

## Memorandum

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Date: February 15, 2002

To: Mary Marshall and Dave Gore, U.S. Bureau of Reclamation

From: Ed West, Ph.D., Jones & Stokes

cc: Jim Goodwin, U.S. Bureau of Reclamation  
Bart Prose, U.S. Fish and Wildlife Service  
Don Wagenet, Navigant Consulting, Inc.  
Steve Centerwall, Jones & Stokes  
Colleen Smith, Jones & Stokes

Subject: Site Assessment of the Battle Creek Salmon and Steelhead Restoration Project Area—Assessment of Bat Habitat in Water Diversion Tunnels

## Introduction

Field surveys of water diversion tunnels at Inskip Diversion Dam, Eagle Canyon Diversion Dam, and along South Battle Creek Canal were conducted on January 28 and 29, 2002, during a site assessment of the Battle Creek Salmon and Steelhead Restoration Project area. The purpose of surveying the water diversion tunnels was to determine the presence of hibernating bats and to assess the potential suitability of these tunnels for use by bats during spring, summer, and fall.

On January 28, water was diverted from the Inskip Diversion Dam tunnels, which allowed Jones & Stokes to conduct walk-through surveys in tunnels 1, 2, and 3. Additionally, Jones & Stokes biologists conducted visual assessments of habitat conditions at the entrance and exit portals of tunnels 7, 8, 9, and 10 along the South Battle Creek Canal. Normal water flow was maintained in these latter tunnels and therefore the tunnels were not entered.

On January 29, Jones & Stokes biologists conducted walk-through surveys in tunnels 1, 2, 3, 4, and 5 along the Eagle Canyon diversion route. Jones & Stokes biologists also conducted visual surveys of general habitat conditions at the portals of South Battle Creek Canal tunnels 1, 2, 3, 4, 5, and 6.

## Results of the Field Survey

One hibernating bat was found inside Inskip Tunnel 3, approximately 100 feet from the entrance portal. From its general size and coloration, this bat appeared to be a big brown bat (*Eptesicus fuscus*); however, it was not disturbed to make a definitive identification. This bat was hanging from the ceiling approximately 9 feet above the bottom of the tunnel. It was not secluded in a

crevice or other niche in the rock wall. It was approximately 4 feet above the normal surface of the water as determined by the height of the waterline on the side of the tunnel.

## **Suitable Tunnel Habitat Conditions**

The following sections describe criteria used to assess the potential suitability of the tunnels for bat hibernation, maternity colonies, summer day (nonmaternity) roosts, and summer night roosts.

**Hibernation.** During hibernation, bats lower their body temperature to near ambient conditions. This lowered body temperature allows them to conserve energy through reduced metabolic activity and thereby survive off stored fat for the duration of the winter. Cold ( $1-5^{\circ}\text{C}$ ), stable temperatures are optimal, though some species will continue to hibernate at  $10^{\circ}\text{C}$ . High humidity is also important to bats during hibernation to reduce the potential for dehydration. Finally, it is critical for hibernating bats to be undisturbed. Bats forced to arouse from hibernation by disturbance can expend vital energy reserves needed to survive the winter and can, in fact, perish from starvation if they do not have enough energy to emerge from hibernation in the spring.

**Maternity Colonies.** Pregnant and lactating females must maintain high body temperatures to provide optimal gestation and nurturing of their young. Maternity roosts therefore must be warm enough to allow the females to maintain normal active body temperature ( $40^{\circ}\text{C}$ ) without expending extra energy to stay warm. Because of the energy requirements of gestation and lactation, pregnant and lactating females cannot enter torpor if temperatures turn cold without jeopardizing the survival of the young. By contrast, male bats can enter torpor any time to conserve energy and often roost in colder areas away from the maternity colony. The absence of disturbance is also an important factor in maternity colonies; females may drop or abandon their young if disturbed.

**Summer Day (Non-Maternity) Roosts.** Optimal day roosts are commonly found in secluded, dark, and quiet sites. Temperatures may vary according to the prevailing outside temperatures, but should not get too hot or too cold. These roosts are also generally in areas inaccessible to predators.

**Summer Night Roosts.** Bats commonly retreat to night roosts for short periods during the night to rest and digest food between foraging flights. Night roosts are usually more exposed and have less stable temperatures than day roosts. Individual bats often use a number of different night roosts. If disturbed from one roosting site, bats can often use others, if available.

## Site Evaluations

The following sections describe habitat conditions for each tunnel, as observed during the January 28 and 29, 2002, field surveys of the project area.

**Inskip Diversion Dam Tunnels.** An evaluation of Inskip Diversion Dam tunnels 1, 2, and 3 is described below.

- Tunnel 1 is a short tunnel that is open to daylight and receives constant airflow. No crevices were observed, and the tunnel does not have a vaulted ceiling. Tunnel 1 would be suitable for night roosts only.
- Tunnel 2 is of moderate length. The tunnel offers some seclusion. No crevices were observed, and the tunnel does not have a vaulted ceiling. Tunnel 2 offers good night roosting habitat and could potentially be suitable as a day roost for small numbers of bats.
- Tunnel 3 is long with good seclusion, several crevices, and 1 area with a vaulted ceiling. This tunnel would be suitable for a maternity colony, day roosts, and night roosts. Tunnel 3 would also be suitable for hibernation, as evidenced by the presence of 1 hibernating bat.

**Eagle Canyon Diversion Dam Tunnels.** Sheets of water present at both the entrance and exit portals would likely impede flight access by bats to all Eagle Canyon tunnels (tunnels 1 through 5). This condition, if it continues throughout the summer and fall, would probably prevent bat usage in all of these tunnels. The interior of the tunnels did not have any significant crevices, but one area in tunnel 4 had an elevated ceiling, which would be suitable for bat use if bats could gain entrance to the tunnel.

**South Battle Creek Canal Tunnels.** Direct access to the South Battle Creek Canal tunnels (tunnels 1 through 10) was not possible because of flowing water. However, the basic structure of the tunnels appeared to be very similar to the Inskip Diversion Dam tunnels. The water level at each tunnel was low enough to allow easy passage of bats into the tunnels. If the water level rises to a 1-foot clearance or less between the tunnel ceiling and the water surface, use by bats may be restricted during the period when the water level is high. Several tunnel characteristics observed during the field survey indicate that, if access is adequate, bats could use the tunnels, particularly the longer tunnels, during both winter and summer months. During winter, the constant flow of cold water would create a stable, cold, humid environment favorable for hibernation. Also, disturbance is not likely to occur in the tunnels. If natural crevices or vaulted ceilings exist in the tunnels, these characteristics would provide highly suitable conditions for hibernating bats, maternity colonies, and nonmaternity day and night roosts.

## Additional Survey Requirements

Bats could potentially use the surveyed tunnels for hibernating, maternity roosts, summer day and night roosts, and migratory stopover roosts. It is presently unknown which, if any, of these uses occur. Hibernation has been verified by the single bat observation. Additional seasonal surveys will be required to determine the presence of bats and their use of the tunnels at other times of the year. Table 1 summarizes the general seasonal activity patterns of 7 species of bats that could potentially use the tunnels or occupy nearby crevices or cliffs within or near the project area.

Table 1. Activity Patterns of 7 Species of Bats with the Potential to Occupy the Surveyed Area

Species	Temporal Patterns
<b>Pale Townsend's big-eared bat</b> [ <i>Corynorhinus</i> (= <i>Plecotus</i> ) <i>townsendii</i> <i>pallascens</i> ]	Hibernation colonies of the Pale Townsend's big-eared bat begin forming in late October; numbers peak by January (U.S. Forest Service 2001). Hibernation occurs in clusters of a few to more than 100 bats (Harvey et al. 1999). Breeding starts within the first 3 weeks of October (U.S. Forest Service 2001). Females congregate at maternity sites in March and June; males are solitary at this time. Maternity colonies occur in 1 or more clusters of up to 100 bats. Usually a single pup is born to each female between May and July, can fly within 3 weeks, and leaves the nursery roost after 2 months. Long-distance migrations are unknown (Harvey et al. 1999).
<b>Spotted bat</b> ( <i>Euderma</i> <i>maculatum</i> )	The spotted bat is capable of torpor and hibernates in some areas (U.S. Forest Service 2001). The bats appear solitary but may hibernate in small groups. Altitudinal migrations from forests to lowlands may occur in autumn. The bats emerge about an hour after dark and return to day roosts about an hour before sunrise (Harvey et al. 1999). In the spring, the bats spend 3–5 minutes foraging per clearing. More time is spent foraging around the same area in summer. One young per year per female bat is born in June (U.S. Forest Service 2001).
<b>Fringed myotis bat</b> ( <i>Myotis</i> <i>hysanodes</i> )	Hibernation of the fringed myotis bat occurs from October to March (U.S. Forest Service 2001). Short local migrations may occur to suitable hibernacula, but extensive migrations are unlikely. A maternity group (typically 200 bats) may remain together through hibernation. Mating takes place in autumn and 1 young is born to each female between late May and early July. After birth, the young are placed in a separate cluster from the adults. The adults fly back and forth between their roost and the cluster of young for feeding (Harvey 1999). Young can fly in about 20 days (U.S. Forest Service 2001).
<b>Long-eared myotis bat</b> ( <i>Myotis</i> <i>evotis</i> )	The long-eared myotis bat is thought to migrate to different elevations to hibernate (U.S. Forest Service 2001). Little is known of any winter activity (California Department of Fish and Game 1990). Females form maternity colonies during the summer, whereas, males and nonbreeding females live singly or in small groups, occasionally occupying the same site as a maternity colony but roosting apart from it (Harvey et al. 1999). One young is born to each female in late June or early July. The species emerges at dusk to forage.

Species	Temporal Patterns
<b>Long-legged myotis bat</b> ( <i>Myotis volans</i> )	The long-legged myotis bat is relatively tolerant of cold temperatures, which may extend the prehibernation period (Harvey et al. 1999). This bat is believed to make short, local migrations for hibernation (U.S. Forest Service 2001). There are usually more males than females at hibernation sites (Harvey et al. 1999). Maternity colonies are moderately gregarious, as are late summer swarming and hibernation groups. In Canada, the bats swarm in August and begin hibernation by late September (Nagorsen and Brigham 1993). Females give birth between May and August. The species emerge in early evening to forage and are active throughout the night with peak activity occurring during the first 3–4 hours after sunset.
<b>Small-footed myotis</b> ( <i>Myotis ciliolabrum</i> )	Movements of the small-footed myotis to hibernacula are probably local (California Department of Fish and Game 1990). The bats hibernate in groups of up to 50 or more bats from November to March (U.S. Forest Service 2001). Maternity colonies usually consist of 12–20 individuals. Typically 1 but sometimes 2 young are born between May and June (Harvey et al. 1999). Most young fly by mid-August (California Department of Fish and Game 1990). Males tend to roost singly (U.S. Forest Service 2001). Foraging begins at dusk and shortly after sunset, with peaks of activity between 10 p.m. and midnight and between 1 a.m. and 2 a.m. (California Department of Fish and Game 1990).
<b>Yuma myotis bat</b> ( <i>Myotis yumanensis</i> )	Winter habits of the Yuma myotis bat are poorly understood, but the bat probably makes local or short migrations to hibernation sites (California Department of Fish and Game 1990). In late May and early June, nursery colonies form (Harvey et al. 1999). Males scatter and lead a solitary lifestyle, foraging at higher elevations (Grinnel 1918). One young is born to each female in late May or early June (Harvey et al. 1999). Nursery roosts are abandoned in autumn for migration (dispersal). Migration location and distance are unknown. These bats emerge to forage when it is nearly dark. After feeding, they retreat to a temporary night roost near the feeding area (Nagorsen and Brigham 1993).

**Source:** Prose, B. 2001. *Memo: Preliminary mitigation recommendations for bats potentially affected by Battle Creek Salmon and Steelhead Restoration Project*. August.

The following text summarizes pertinent seasonal activity information provided in the previous table.

- Hibernation generally can start in October and last until March.
- Maternity colonies can form as early as March.
- Peak birthing occurs between May and July.
- Mating commonly occurs at the maternity roost following completion of rearing of the young, approximately 2 months after the young are born. Migration, if it occurs, will follow soon after.
- Resident species may be present in the tunnels year round.

Surveys to determine the presence of bats in the tunnels should be conducted during the spring (March through mid-May), summer (June through August), fall (mid-August through mid-October), and winter (November through February). No detection of bats in the tunnels at any one of these seasons does not necessarily mean the tunnels are not used during other seasons.

However, the most sensitive periods in relation to impact on bat species would occur during the spring breeding season (maternity period) and winter (hibernation period).

## **Impact Avoidance, Minimization, and Mitigation Recommendations**

Prior to all construction activities, surveys to determine the presence or absence of bats should be conducted as prescribed above at least 1 year prior to construction. If use of the tunnels is not detected or if bat use occurs periodically (i.e., bats are not present during 1 or more seasons), construction activities should be restricted where practicable to the nonuse periods. If bat use is year round, potential disturbance impacts can be minimized if construction occurs during the nonbreeding and nonhibernation periods. If impacts are unavoidable during any season, selected minimization actions, including temporary closure and sound proofing of tunnel entrances during the day, can be implemented to reduce disturbance of roosting bats. All appropriate mitigation measures used to avoid disturbance should be developed during consultation with bat specialists and the U.S. Fish and Wildlife Service before disturbance occurs.

Decommissioned tunnels offer an excellent opportunity to develop compensatory enhancement of bat habitat. Abandoned tunnels can be enhanced for bat habitat by dewatering the tunnels and installing tunnel baffles, end walls, and bat gates. Figure 1 shows the designs of 4 different tunnel endwall patterns and their effects on the airflow, temperature, and humidity in the tunnels. The optimal design will depend on the length and general conformation of the tunnels. For shorter tunnels, baffles can be installed to create larger pockets of stable microclimate areas favorable for roosting. These designs are specific for the creation of favorable habitat for hibernacula. Designs for maternity roosts will be different, depending on the interior conformation of the tunnels and airflow patterns created following dewatering. Prior to the installation of any of these designs, the microclimate of the interior should be monitored to document air flow, temperature, and humidity patterns. The final design for entry closure should be developed in consultation with bat specialists knowledgeable on the physiological and behavioral requirements of the species that would occupy the tunnels.

Except for complete tunnel closure, the designs in figure 1 leave sizeable openings in the endwalls. The construction is also based on the use of cinder blocks. Both conditions would allow easy access and vandalism. Protection of the tunnels from unauthorized entry and destruction could be achieved by the installation of steel bat gates. The American Cave Conservation Association has developed designs for bat-compatible gates that have been approved by Bat Conservation International. Copies of these designs are attached to this report (attachment 1). Prior to installation, any tunnel closure must first be approved by the appropriate state and federal authorities. All construction should be performed by experienced contractors.

Bat Conservation International offers annual workshops on bat gate design and installation. The next workshop will be held March 4–6, 2002, in Austin, Texas. Information on these program and registration materials for the workshop is attached to this report (attachment 2).

## Literature Cited

California Department of Fish and Game. 1990. *California's wildlife: vol. III, mammals*. California Wildlife Relationships System. Sacramento, California.

Grinnel, Hilda Wood. 1918. A synopsis of the bats of California. *University of California Publications. Zoology*. Vol. 17, No. 12. January 31, 1918. Berkeley, CA: University of California Press.

Harvey, Michael J., Scott J. Altenbach, and Troy L. Best. 1999. *Bats of the United States*. Arkansas Game & Fish Commission and U.S. Fish and Wildlife Service.

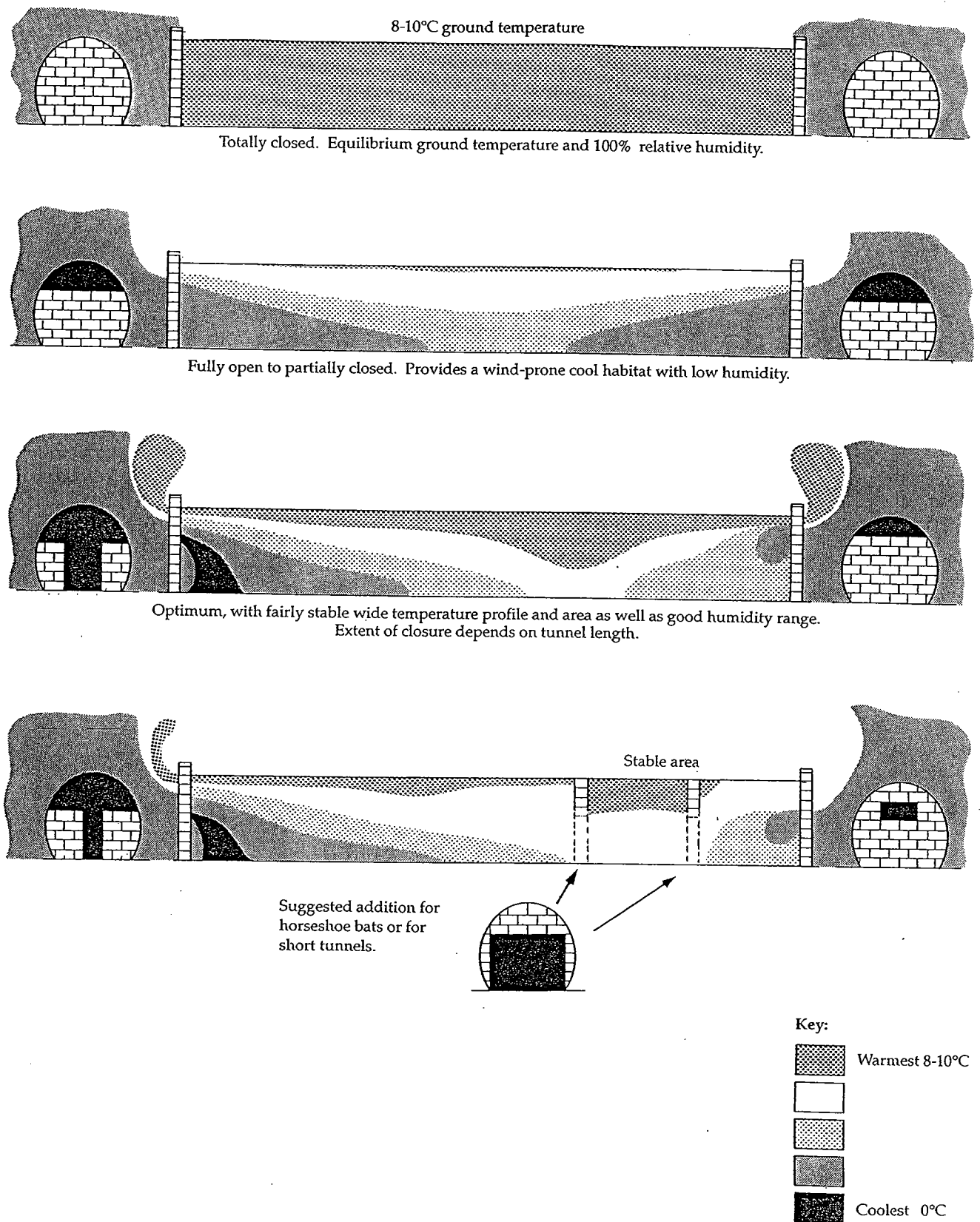
Nagorsen, David W., and Mark Brigham. 1993. Royal British Columbia Museum Handbook. *Bats of British Columbia*. Vol. 1, The Mammals of British Columbia. Vancouver, BC V6T 1Z2: UBC Press, University of British Columbia, 6344 Memorial Road.

U.S. Forest Service. 2001. *Sierra Nevada forest plan amendment, final environmental impact statement*. Appendices, Vol. 3, Chapter 3, Part 4. U.S. Department of Agriculture Forest Service, Pacific Southwest Region.

**Microclimate Control Closure Designs for  
Tunnels Used by Bats**

**Figure 1. Creating Bat Hibernacula from Tunnels .**





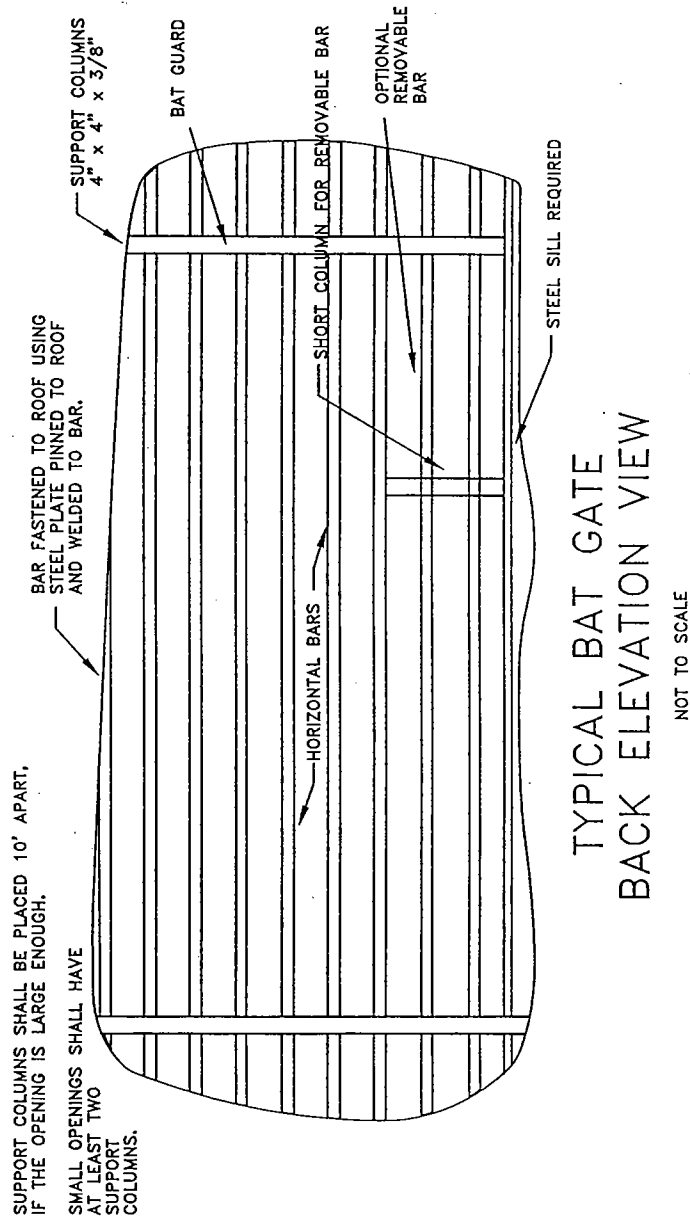
**Figure 1.** Creating bat hibernacula from tunnels. Air flow, temperature and humidity can be controlled by the design of the end-walls. Winter temperatures and air flows are shown.

From: Mitchell-Jones, A. J. 1999. Conserving and creating Bat roosts. In Bat Workers' manual. A. J. Mitchell-Jones and A. P. McLeish (editors). Joint Nature Conservation Committee. 138 pp.

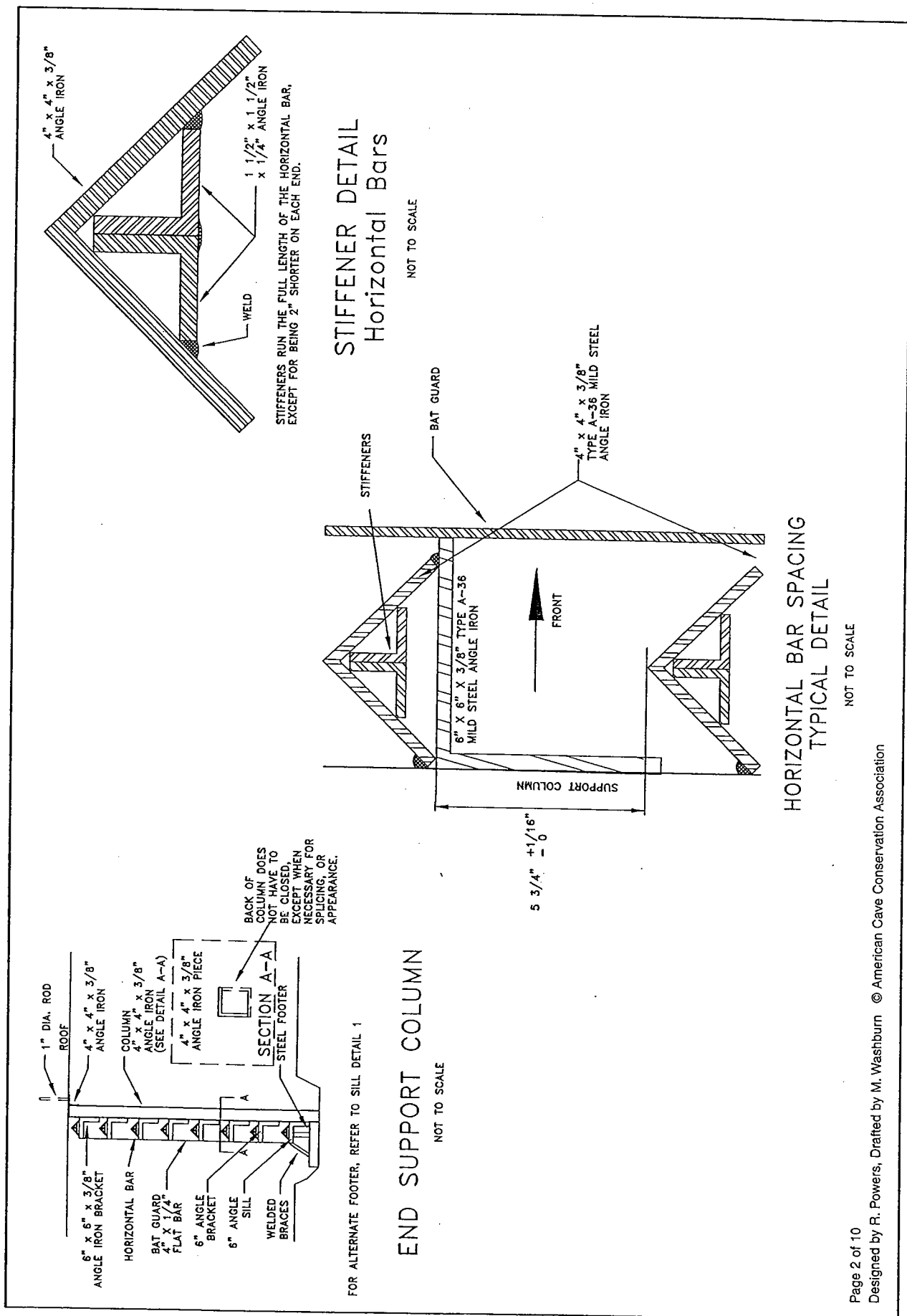
## **Attachment 1**

### **Bat Gate Designs**

These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



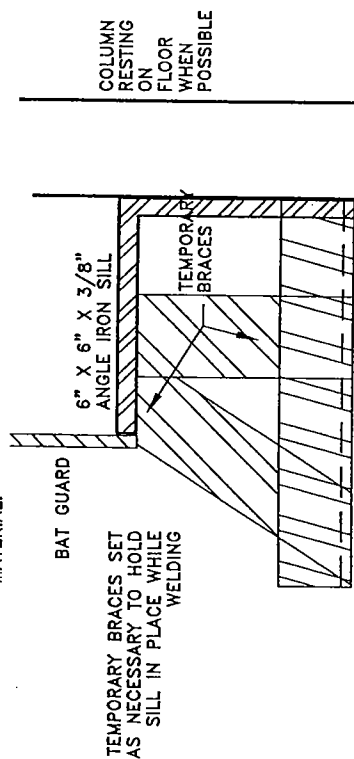
These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



# Appendix III Design A

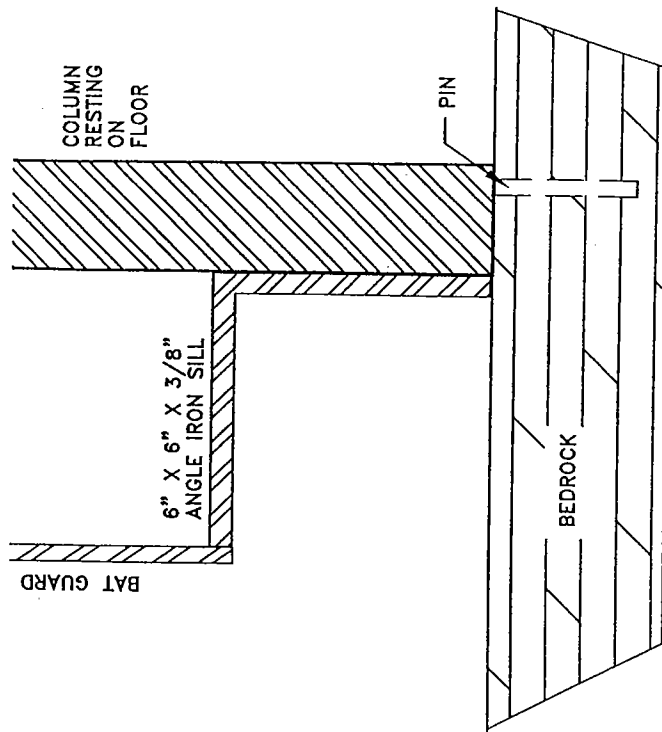
These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).

SILL SHALL BE EXCAVATED TO FIT THE SITE CONDITIONS, BUT REST ON SOIL OR LOOSE ROCK MATERIAL.



4" X 4" X 3/8" FOOTERS SPACED EVERY 3' TO 5' ALONG THE LENGTH OF THE SILL, FRONT OR BACK.

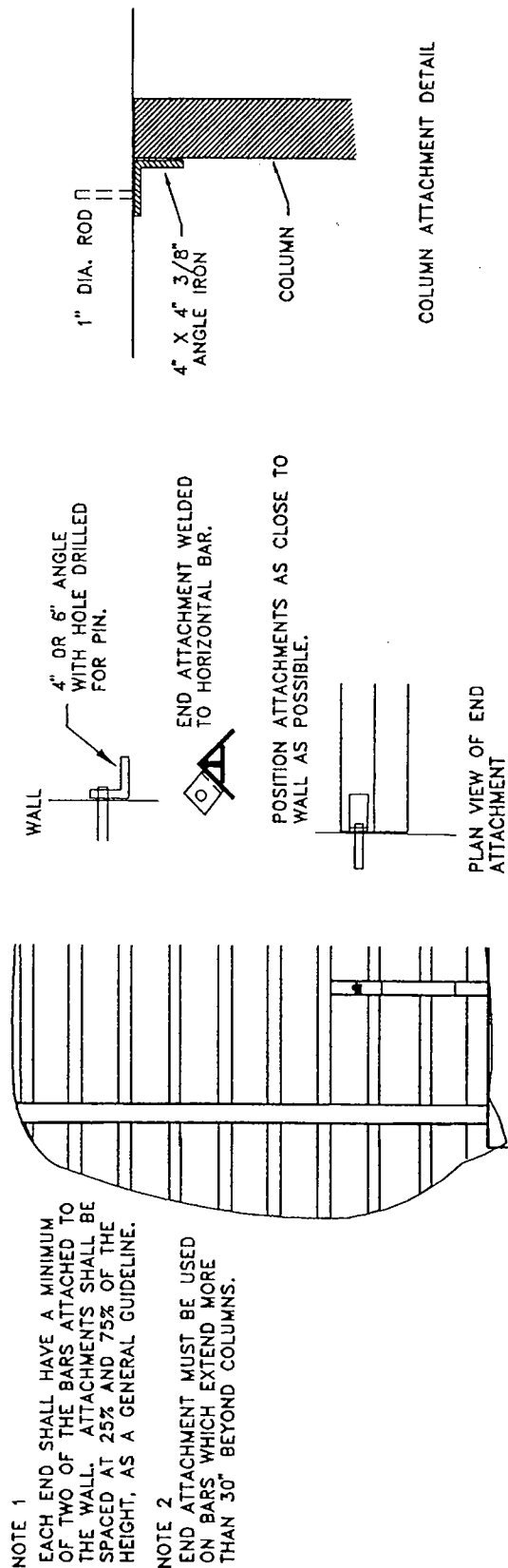
SILL DETAIL 1  
NOT TO SCALE



SILL DETAIL FOR BEDROCK FLOOR

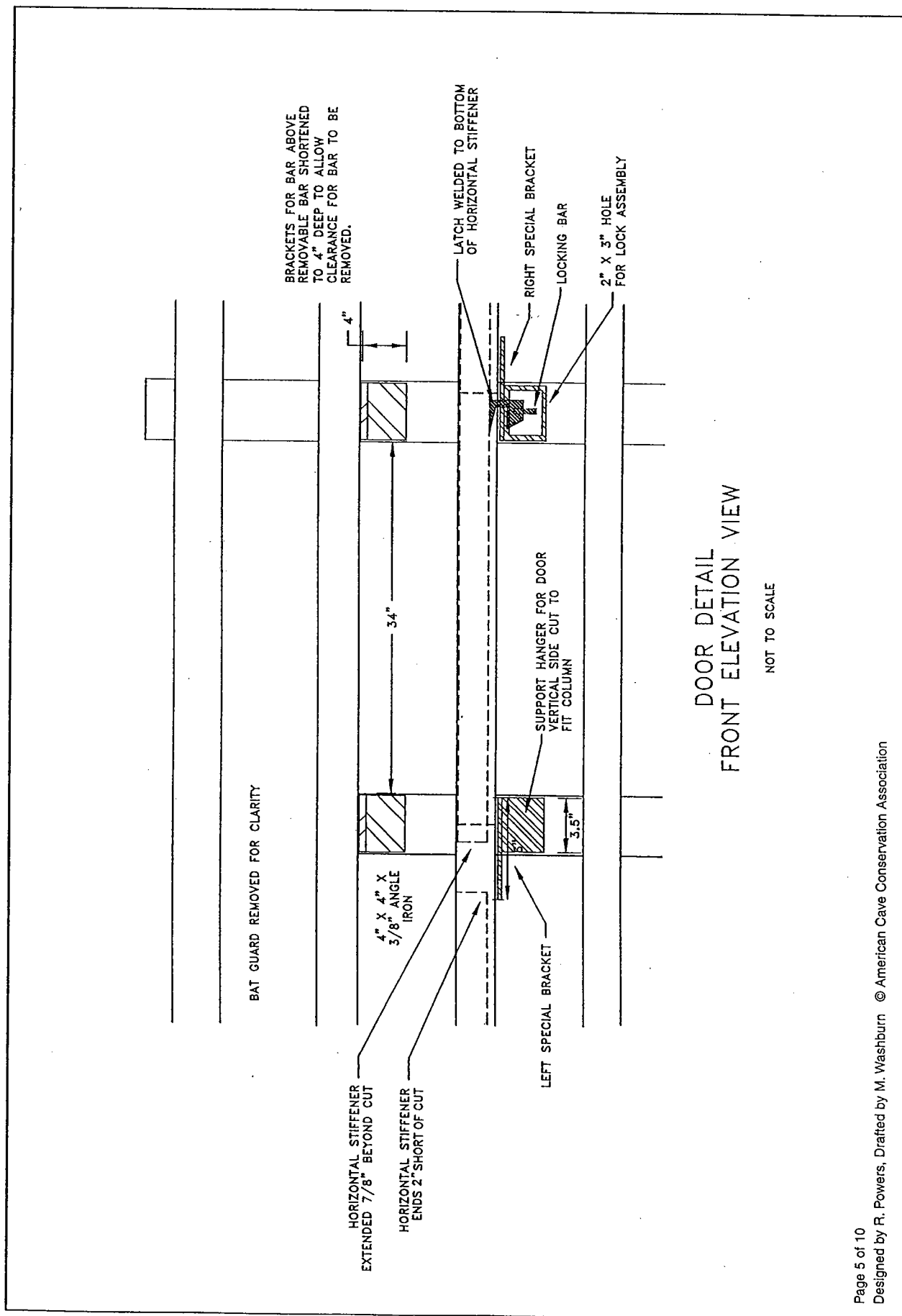
# Appendix III Design A

These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



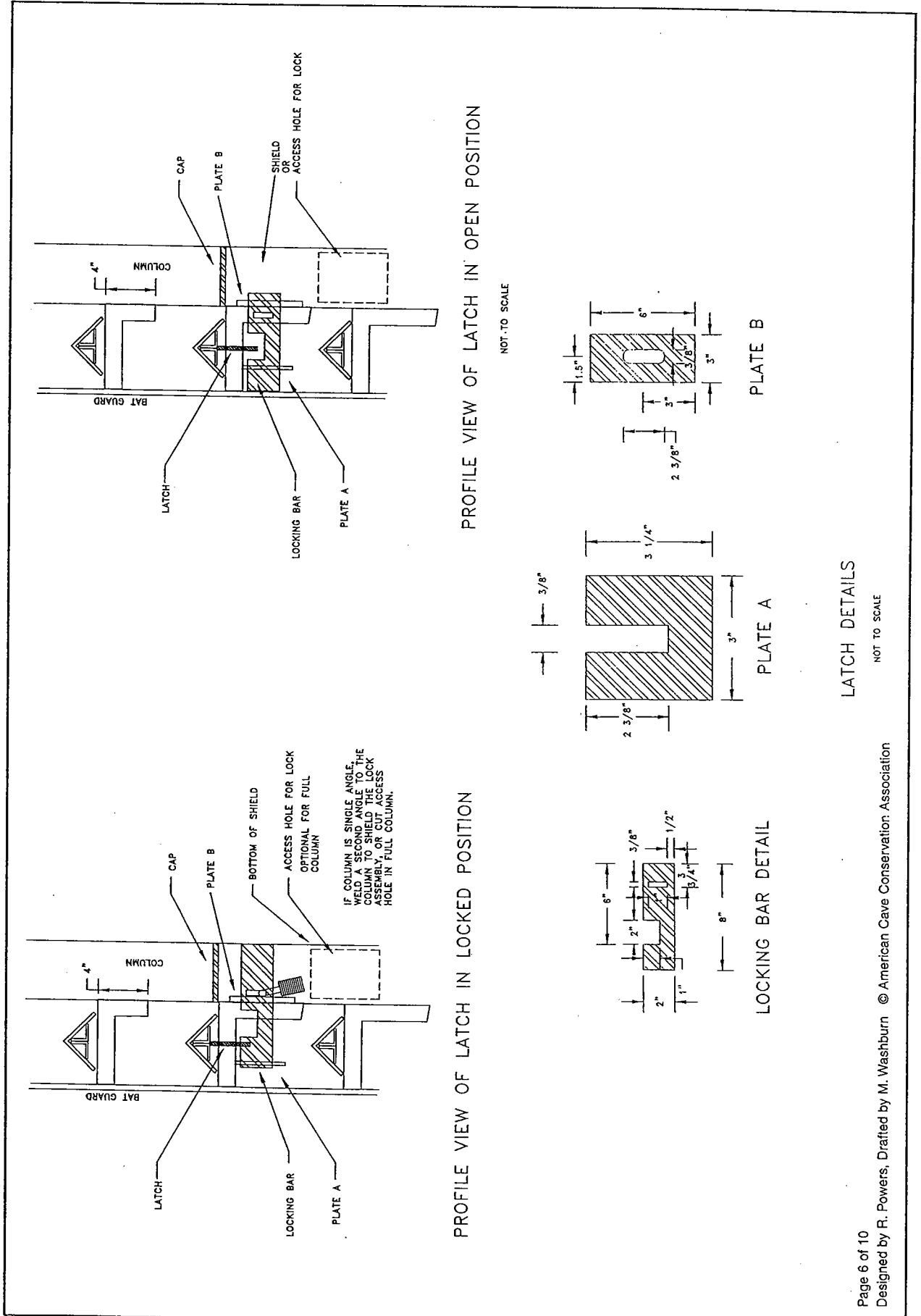
## ATTACHMENT DETAILS

NOT TO SCALE



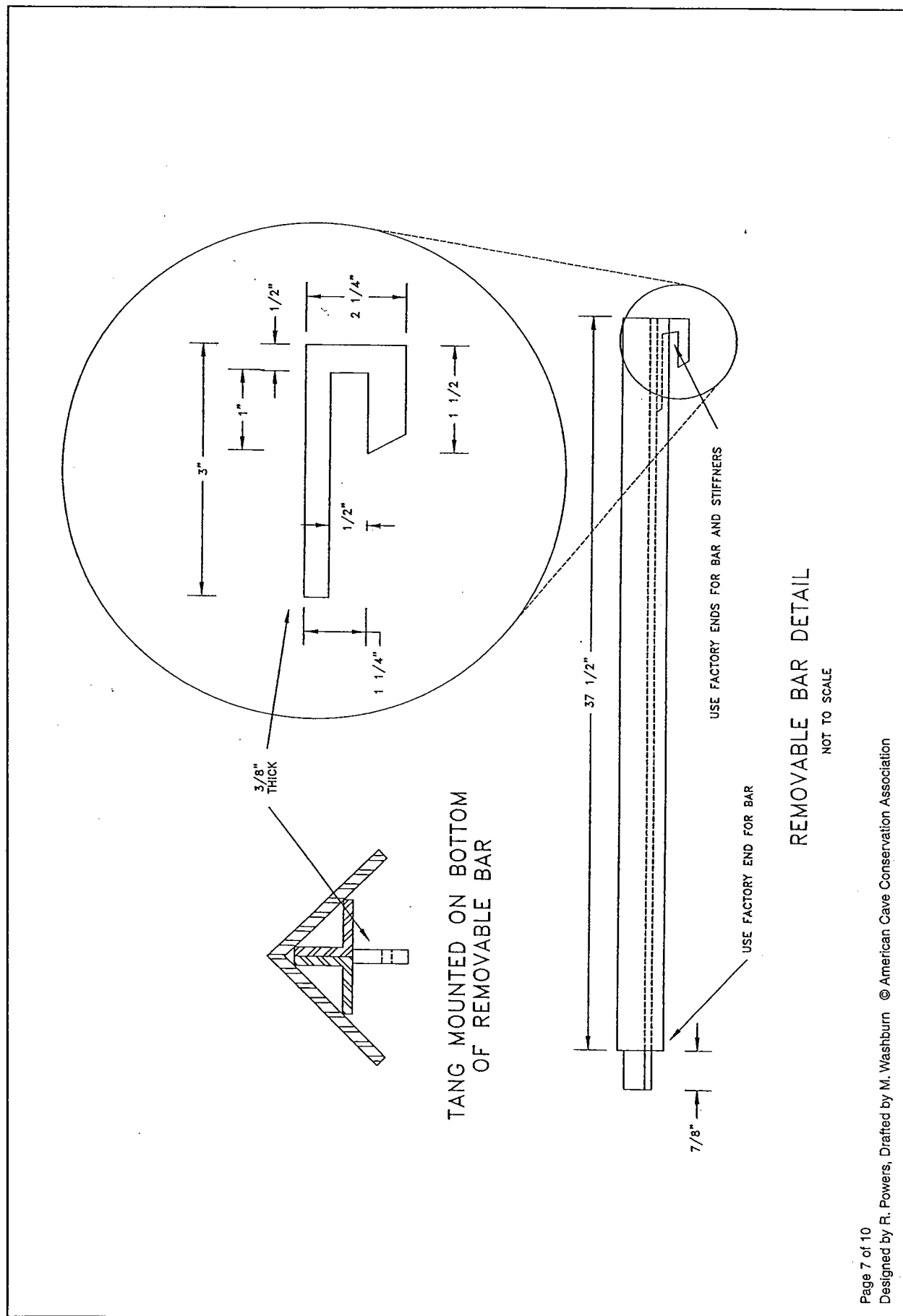
# Appendix III Design A

These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).





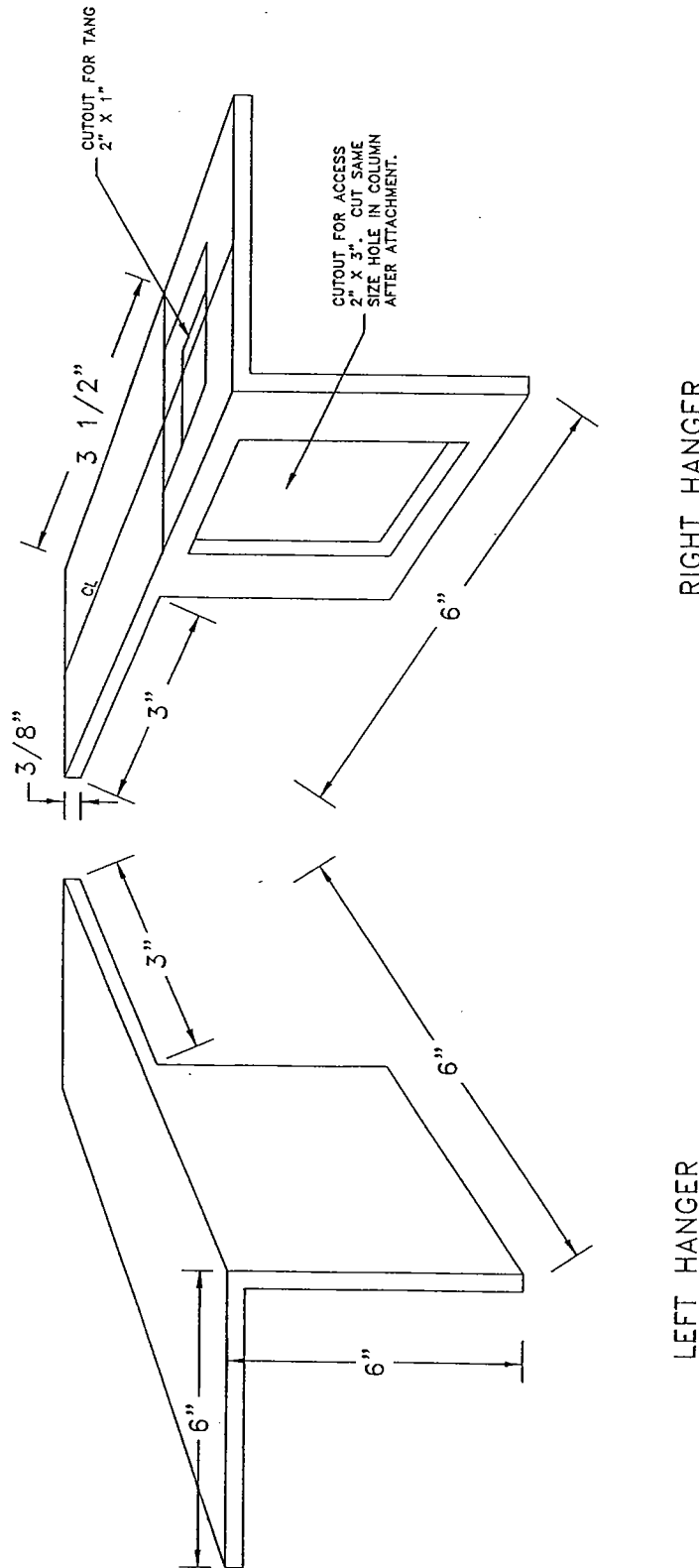
These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



# Appendix III

## Design A

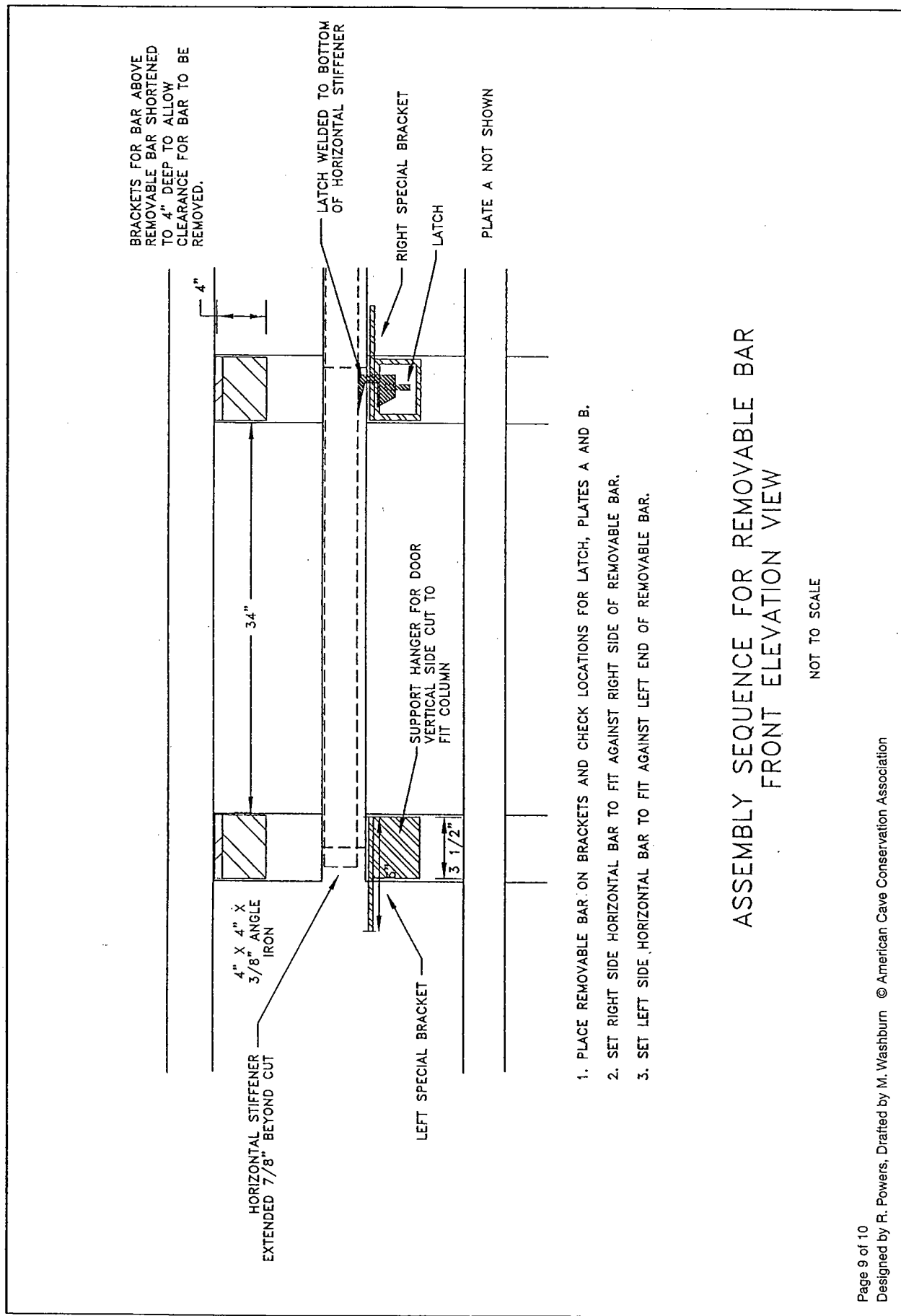
These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



SPECIAL BRACKETS FOR SUPPORTING REMOVABLE BARS

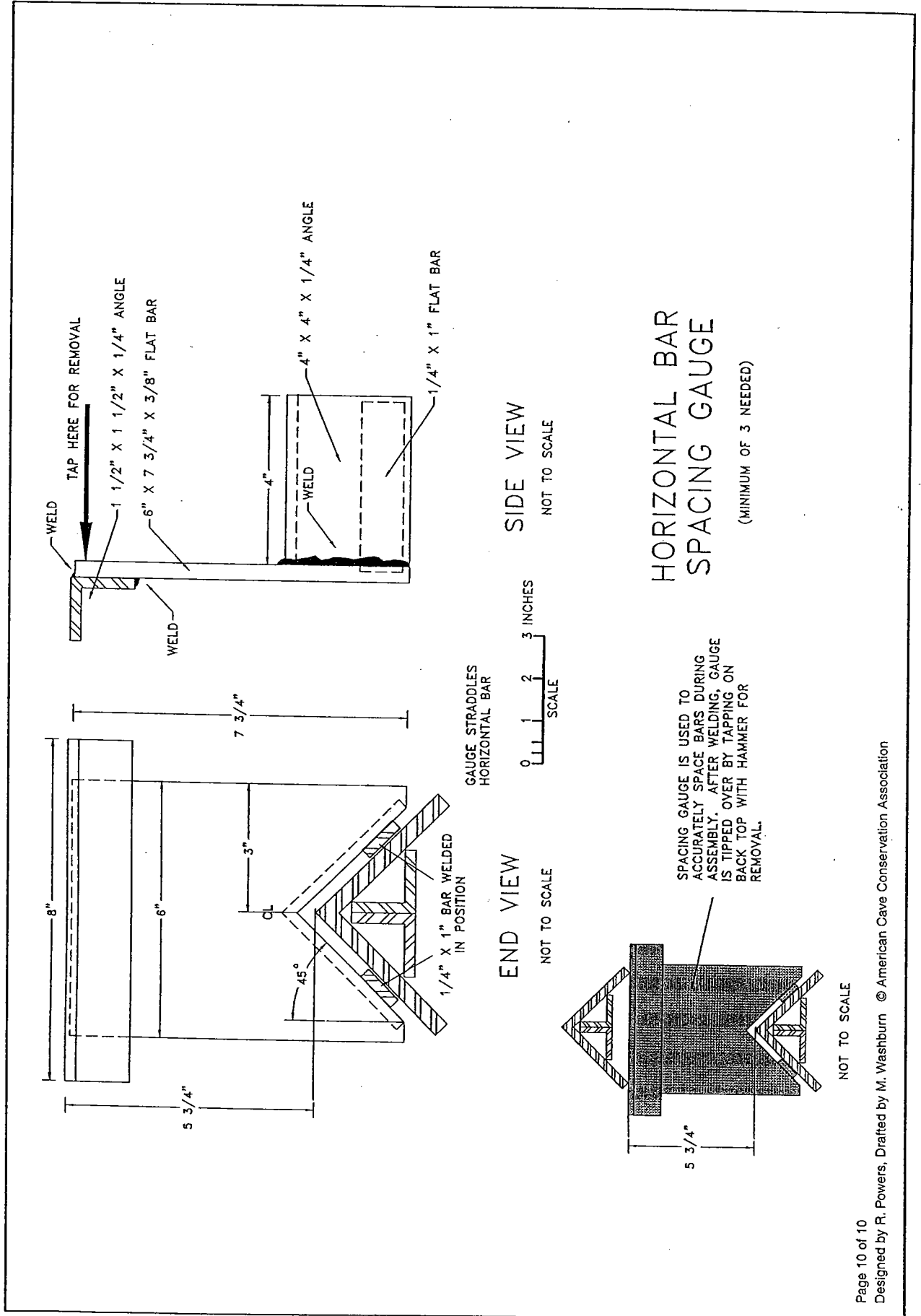
NOT TO SCALE

These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



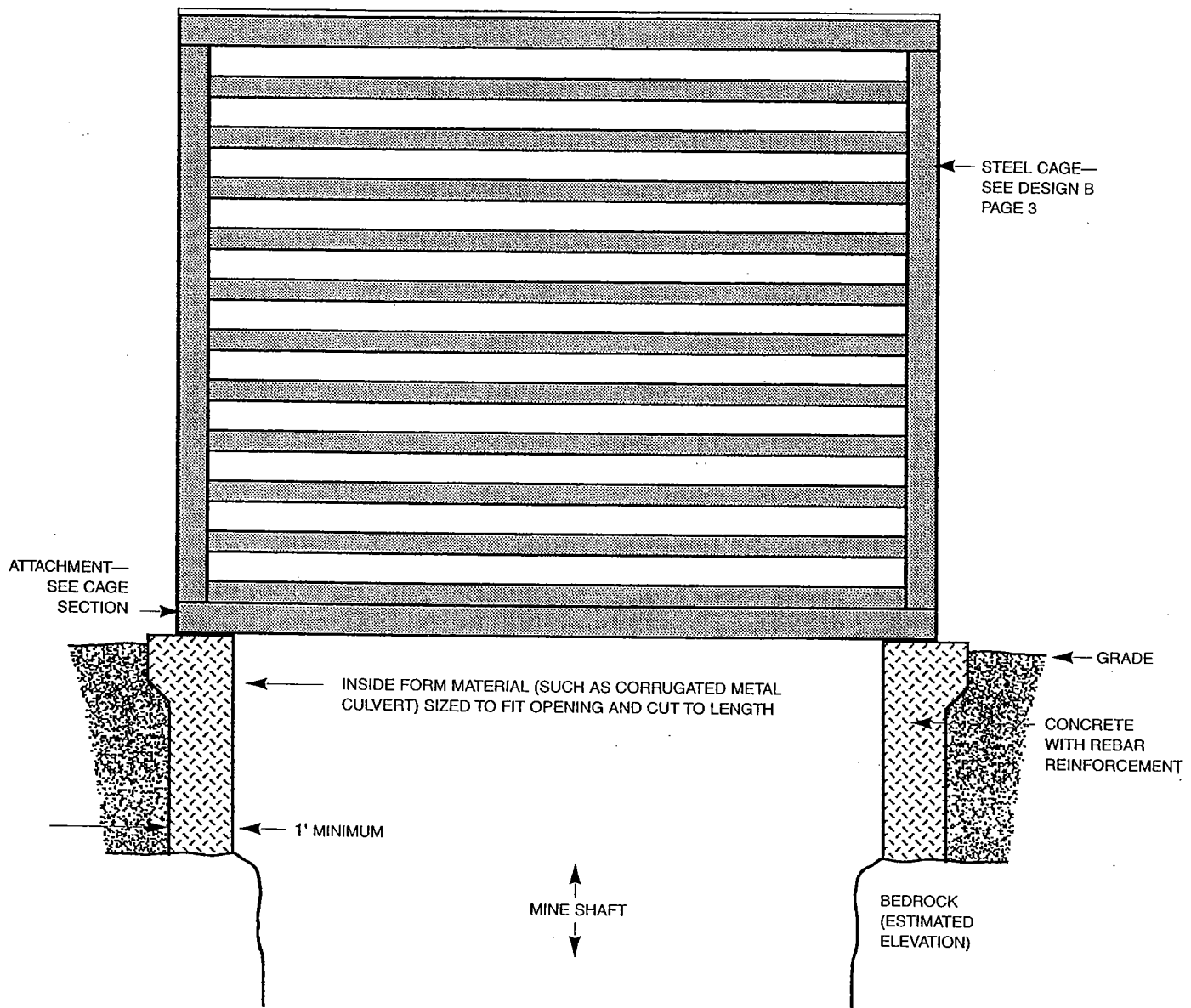
# Appendix III Design A

These plans are provided courtesy of the American Cave Conservation Association and are revised annually. Contact the ACCA for current construction specifications or for consultation on special needs (see Appendix II).



## Appendix III

### Design B

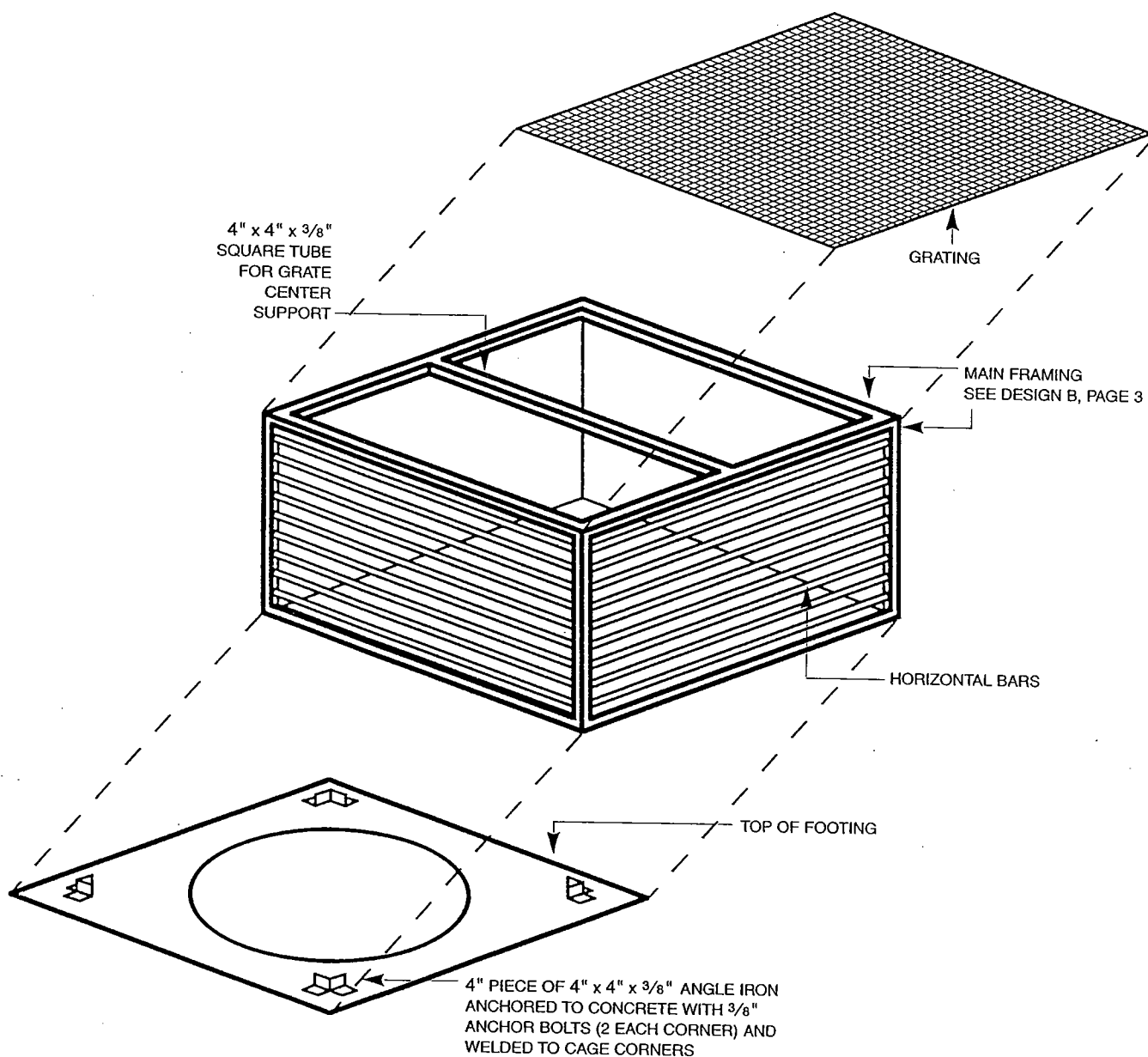


VERTICAL SHAFT & CAGE CROSS-SECTION

NOT TO SCALE

# Appendix III

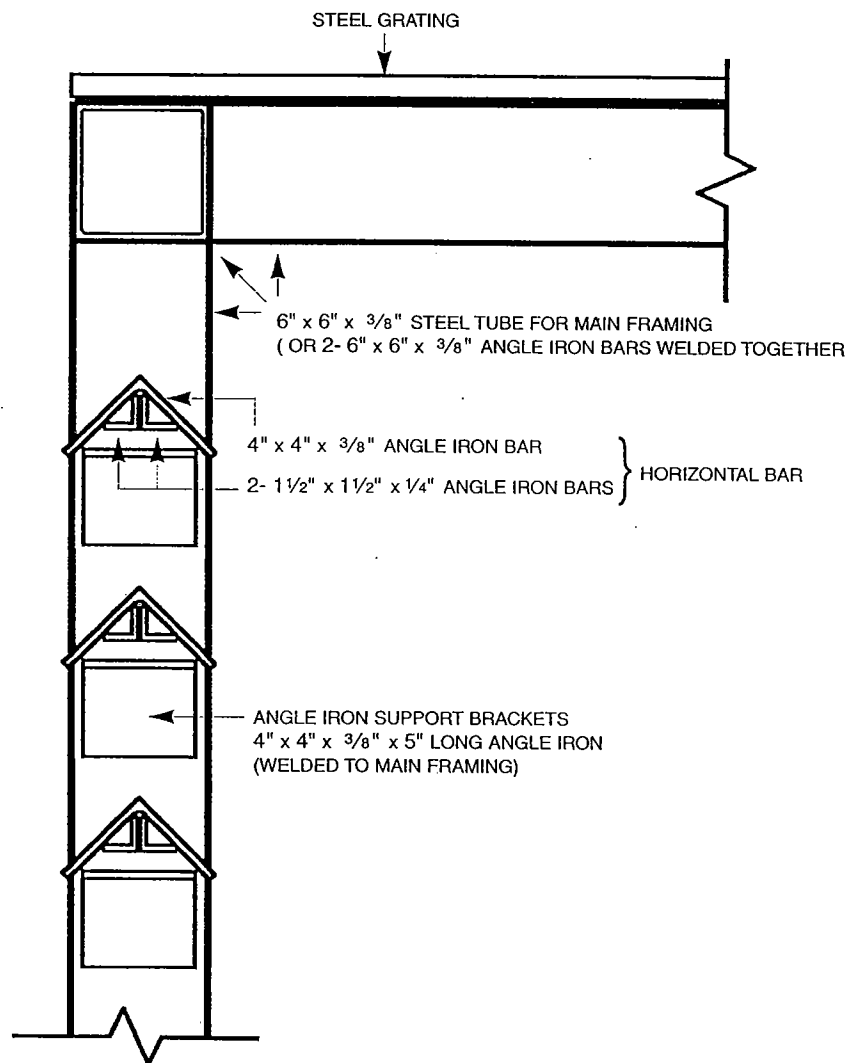
## Design B



CAGE ASSEMBLY SCHEMATIC  
NOT TO SCALE

# Appendix III

## Design B



CAGE SECTION  
NOT TO SCALE

**Attachment 2**

**Bat Conservation International Symposium on  
Cave and Mine Protection: Bat Gate Design**

**March 4-6, 2002  
Austin, Texas**



## *Symposium on Cave and Mine Protection*

March 4-6, 2002

Bat Conservation International, the U. S. Fish and Wildlife Service, and the USDI Office of Surface Mines are hosting a symposium on cave and mine protection options in Austin, Texas on 4-6 March, 2002, with an optional field trip on 7 March.

The proceedings from this meeting should provide a definitive "gating manual" for cavers, biologists, and resource managers. Contact Jim Kennedy for more information.

Adobe .PDF Files:

Bat Gate Brochure

Bat Gate Agenda

Bat Gate Registration Form

Sponsors

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# FORUM TOPICS

WHY DO WE PROTECT  
MINES AND CAVES?

PROJECT PLANNING

DESIGN PROCESS

SPECIFIC CLOSURE DESIGNS

CONSTRUCTION  
MANAGEMENT

MONITORING AND  
MAINTENANCE

## STEERING COMMITTEE

American Cave Conservation Association

*Roy Powers*

Bat Conservation International

*Jim Kennedy*

Gating Consultant

*Dave Dalton,*

*Marion Vittetoe*

Indiana Karst Conservancy

*Keith Dunlap*

National Speleological Society

*Val Hildreth-Werker, Jim Werker*

New Mexico Mining and Minerals Division

*John Kretzmann*

University of California at Los Angeles

*Pat Brown*

USDOI Fish and Wildlife Service

*Robert Currie*

USDOI Office of Surface Mining

*Len Meier,*

*Kimery Vories (Forum Chairperson)*

Utah Division of Oil, Gas, and Mining

*Mark Mesch*

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## BAT GATE DESIGN

### A TECHNICAL INTERACTIVE FORUM



**March 4-6, 2002**

**Red Lion Hotel**

6121 N I-35 & US Hwy 290

Austin, Texas

**March 7, 2002**

**Cave Gate Field Trip**

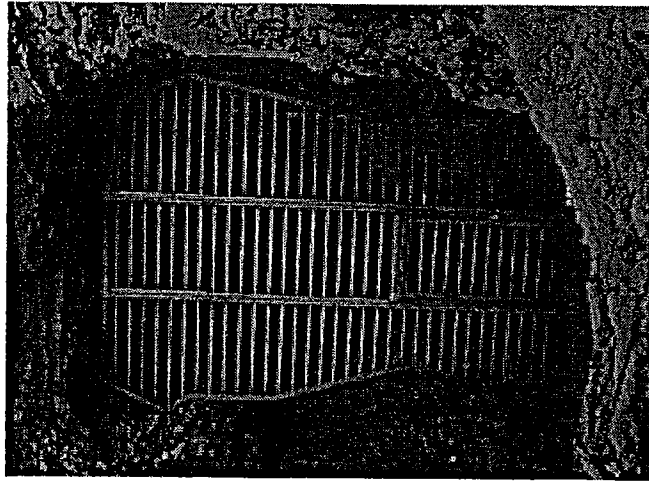
HOSTED BY

U.S. DOI Fish and Wildlife Service

Bat Conservation International

U.S. DOI Office of Surface Mining

# BAT GATE DESIGN



On November 14-16, 2000, the Office of Surface Mining and Bat Conservation International cosponsored a technical interactive forum on Bat Conservation and Mining. One of the recommendations of the participants of that forum was to develop a manual on bat gate design.

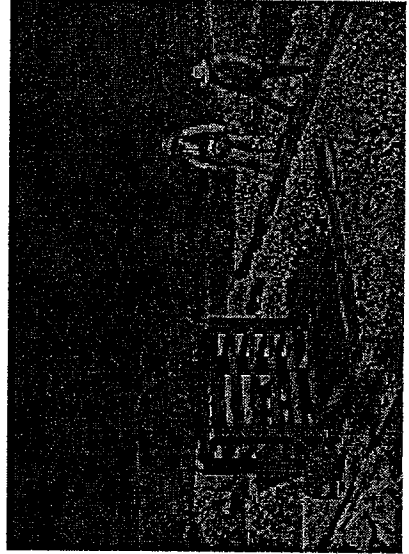
On April 21, 2001, a multi-interest group bat gate design steering committee was formed under the co-sponsorship of the U.S. DOI Fish and Wildlife Service, Bat Conservation International, and the U.S. DOI Office of Surface Mining. The objective of the steering committee was to plan for and hold a technical interactive forum that would serve to develop, for distribution by the Fish and Wildlife Service, Bat Conservation International, and others, a manual on how to best protect important caves and underground mines used by bats through the use of gates and other bat friendly closure devices.

## REGISTRATION DETAILS

### AVAILABLE AT:

[www.mcrc.org/osmre.gov/bats](http://www.mcrc.org/osmre.gov/bats)

[www.batcon.org](http://www.batcon.org)



The purpose of the forum is to provide:

- An organized format for discussion of issues concerning the design, construction, maintenance, and monitoring of bat friendly closures;
- Easily understood, state-of-the-art summary talks by knowledgeable speakers;
- A published proceedings both in hard copy and electronically to serve as a manual on bat gate design;
- Access to the discussions for all interested parties at the forum.



# PROGRAM

## BAT GATE DESIGN:

### A TECHNICAL INTERACTIVE FORUM

March 4 - 6, 2002

Red Lion Hotel  
Austin, Texas

#### MONDAY, March 4, 2002

- 7:00 AM**     **Check in, Coffee and Pastry**  
Check in at the Red Lion Hotel, 6121 N. I-35 and U.S. Hwy 290,  
Austin, Texas 78752
- 8:00 AM**     **Welcome**  
*Dr. Merlin Tuttle, Bat Conservation International, Austin, Texas*
- 8:10 AM**     **Introduction and Purpose of Forum**  
*Kimery Vories, Forum Chairperson, Office of Surface Mining,  
Alton, Illinois*

**BAT GATE DESIGN**





## MONDAY, March 4, 2002

**8:25 AM    Session #1 WHY DO WE PROTECT  
MINES AND CAVES?**

*Session Chairpersons: Val Hildreth-Werker and Jim Werker,  
National Speleological Society, Hillsboro, New Mexico*

**8:30 AM    Importance of Protecting Caves**

*Ronal Kerbo, National Park Service, Denver, Colorado*

**9:00 AM    Importance of Protecting Mines**

*Scott Altenbach, University of New Mexico, Albuquerque, New  
Mexico*

**9:30 AM    History of Protection Efforts**

*Robert Currie, U.S. DOI Fish & Wildlife Service, Asheville,  
North Carolina*

**10:00 AM    REFRESHMENT BREAK**

**10:15 AM    Legal and Regulatory Environment**

*Jim Nieland, U.S. Forest Service, Amboy, Washington and  
Len Meier, Office of Surface Mining, Alton, Illinois*

**10:45 AM    Management and Protection Issues on Private Land**

*Heather Garland, The Nature Conservancy—Tennessee,  
Nashville, Tennessee*

**11:15 AM    Consequences of Not Protecting the Resource**

*Mark Mesch, Utah Division of Oil, Gas, and Mining,  
Salt Lake City, Utah*

**11:45 AM    PARTICIPANT INTERACTIVE DISCUSSION**

**12:05 PM    LUNCH (Included in Registration)**

**BAT GATE DESIGN**





## MONDAY, March 4, 2002

- 1:05 PM Session #2 PROJECT PLANNING**  
*Session Chairperson: Len Meier, Office of Surface Mining, Alton, Illinois.*
- 1:10 PM Developing a Project Strategy**  
*Susanna Henry, Kofa National Wildlife Refuge, Yuma, Arizona*
- 1:40 PM Performing a Needs Assessment**  
*Rick Olson, National Park Service, Mammoth Cave, Kentucky*
- 2:10 PM Bio-assessment—Determining the Suitability of Mines and Caves for Bats**  
*Dr. Patricia Brown, University of California at Los Angeles, Bishop, California*
- 2:40 PM Developing a Cave or Mine Management Plan**  
*Amy Fesnock, Pinnacles National Monument, National Park Service, Paicines, California*
- 3:10 PM REFRESHMENT BREAK**
- 3:25 PM National Environmental Policy Act (NEPA) Compliance**  
*Fred Sherfy, Office of Surface Mining, Harrisburg, Pennsylvania*
- 3:55 PM Funding a Bat Gate Project**  
*Joseph Kath, Illinois DNR, Division of Natural Heritage, Springfield, Illinois*
- 4:25 PM Cave Gating Partnerships: Success through Careful Planning and Coordination**  
*Steve Walker, Bat Conservation International, Austin, Texas*
- 4:55 PM Training Opportunities for Cave and Mine Gaters**  
*Jim Kennedy, Bat Conservation International, Austin, Texas*
- 5:25 PM PARTICIPANT INTERACTIVE DISCUSSION**
- 5:45 PM ADJOURN AND SOCIAL RECEPTION w/Poster Session**

## BAT GATE DESIGN





## **TUESDAY, March 5, 2002**

**7:30 AM Coffee and Pastry**

**8:30 AM Session #3 CLOSURE DESIGN: PART 1**

*Session Chairperson: John Kretzmann, New Mexico Abandoned Mine Land Bureau, Sante Fe, New Mexico*

**8:35 AM Overview of Closure Strategies**

*Robert Currie, U.S. DOI Fish & Wildlife Service, Asheville, North Carolina*

**8:55 AM Soft Closures**

*Bob and Debbie Buecher, National Speleological Society, Tucson, Arizona*

**9:25 AM Cable Nets for Bat Habitat Preservation**

*John Kretzmann, New Mexico Abandoned Mine Land Bureau, Sante Fe, New Mexico*

**9:55 AM REFRESHMENT BREAK**

**10:10 AM Solid and Invertebrate Door Gate Option**

*Mike Warton, Mike Warton & Associates, Cedar Park, Texas*

**10:40 AM Culvert Closure Design and Construction**

*Jim Langdon, Idaho Panhandle National Forest, Couer d' Alene, Idaho*

**11:10 AM Flyover Barriers as a Method for Cave Bat Protection**

*Blake Sasse, Arkansas Game & Fish, Little Rock, Arkansas*

**11:40 AM PARTICIPANT INTERACTIVE DISCUSSION**

**12:00 Noon LUNCH (Provided in Registration)**

## **BAT GATE DESIGN**





## TUESDAY, March 5, 2002

### 1:00 PM **Session #4 CLOSURE DESIGN: PART 2**

*Session Chairpersons: Keith Dunlap, Indiana Karst Conservancy, Indianapolis, Indiana; Roy Powers, American Cave Conservation Association, Duffield, Virginia*

### 1:05 PM **Ladder Gate Design**

*Kirk Navo, Colorado Division of Wildlife, Monte Vista, Colorado*

### 1:35 PM **Horizontal Bar Gate Option Overview**

*Dave Dalton, Gating Consultant, Tucson, Arizona*

### 2:05 PM **Angle Iron Gate**

*Roy Powers, American Cave Conservation Association, Duffield, Virginia*

### 2:35 PM **Rectangular Tube Gate**

*Marion Vittetoe, Gating Consultant, Tucson, Arizona*

### 3:05 PM **REFRESHMENT BREAK**

### 3:20 PM **Round Bar Manganal Steel "Jail Bar" Bat Gate**

*Louis Amodt and Mark Mesch, Utah Division of Oil, Gas, and Mining, Salt Lake City, Utah*

### 3:50 PM **Bat Cupola Design Consideration**

*John Kretzmann, New Mexico Mining and Minerals Division, Sante Fe, New Mexico*

### 4:20 PM **Material Selection**

*Jim Werker, National Speleological Society, Hillsboro, New Mexico*

### 4:50 PM **PARTICIPANT INTERACTIVE DISCUSSION**

### 5:10 PM **ADJOURN**

## BAT GATE DESIGN





**WEDNESDAY, March 6, 2002**

- 7:30 AM** Coffee and Pastry
- 8:00 AM** **Session #5 CONSTRUCTION MANAGEMENT**  
*Session Chairperson: Dr. Patricia Brown, University of California at Los Angeles, Bishop, California*
- 8:05 AM** **Contract Management**  
*Paul Krabacher, Colorado Division of Minerals & Geology, Grand Junction, Colorado*
- 8:35 AM** **Eastern Consultant Perspective**  
*Kristin Bobo, American Cave Conservation Association, Duffield, Virginia*
- 9:05 AM** **Western Contractor Perspective**  
*Sam Edwards, Frontier Environmental Services, Ridgecrest, California*
- 9:35 AM** **Partner and Volunteer Logistics**  
*Mark Stacy, Indiana DNR, Division of Reclamation, Jasonville, Indiana*
- 10:05 AM** **REFRESHMENT BREAK**
- 10:20 AM** **Safety Issues**  
*John Burghardt, National Park Service, Mining and Minerals Branch, Denver, Colorado*
- 10:50 AM** **On-Site Coordination and Work**  
*Jim Nieland, U.S. Forest Service, Amboy, Washington*
- 11:20 AM** **Personnel and Qualifications**  
*Bob Hall, Bureau of Land Management, Kingman, Arizona*
- 11:50 AM** **PARTICIPANT INTERACTIVE DISCUSSION**
- 12:10 AM** **LUNCH (Provided in Registration)**

**BAT GATE DESIGN**



**WEDNESDAY, March 6, 2002**

**1:10 PM      Session #6 MONITORING AND  
MAINTENANCE**

*Session Chairperson: Robert Currie, U.S. DOI Fish and Wildlife  
Service, Asheville, North Carolina*

**1:15 PM      Bat Response to Gates**

*Scott Altenbach and Rick Sherwin, University of New Mexico,  
Albuquerque, New Mexico*

**1:45 PM      Pre & Post Gate Biological Monitoring**

*Mike Herder, Bureau of Land Management, St. George, Utah*

**2:15 PM      Pre & Post Gate Microclimate Monitoring**

*Jim Kennedy, Bat Conservation International, Austin, TX*

**2:45 PM      Closure Repair and Maintenance**

*Dave Bucknam, Colorado DNR, Minerals & Geology Division,  
Denver, Colorado*

**3:15 PM      REFRESHMENT BREAK**

**3:30 PM      Human Access: Policies, Management, & Monitoring**

*Jim Nieland, U.S. Forest Service, Amboy, Washington*

**4:00 PM      Demonstration of Gate Monitoring Database**

*Mark Mesch and Paul Wisniewski, Utah Division of Oil, Gas, and  
Mining, Salt Lake City, Utah and Len Meier, Office Surface Min-  
ing, Alton, Illinois*

**4:30 PM      PARTICIPANT INTERACTIVE DISCUSSION**

**4:50 PM      Forum Conclusion - Where Do We Go From Here?**

*Robert Currie, U.S. DOI Fish & Wildlife Service, Asheville,  
North Carolina*

**5:10 PM      ADJOURN**

**BAT GATE DESIGN**



# REGISTRATION FORM

## BAT GATE DESIGN:

### A TECHNICAL INTERACTIVE FORUM

HOSTED BY THE U.S. DOI FISH & WILDLIFE SERVICE, BAT CONSERVATION  
INTERNATIONAL, AND THE U.S. DOI OFFICE OF SURFACE MINING

FORUM LOCATION: RED LION HOTEL

6121 N. I 35, Austin, TX 78758

March 4-6, 2002

Please complete a separate registration form for each person. Photocopies are accepted. Registration may be limited based on space availability. Registration should be received by February 10, 2002 in order to facilitate food preparation, but will be accepted up to the date of the forum.

NAME \_\_\_\_\_  
BADGE NAME (if different) \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_  
ORGANIZATION \_\_\_\_\_  
PHONE ( ) \_\_\_\_\_ FAX ( ) \_\_\_\_\_ E-MAIL \_\_\_\_\_

#### REGISTRATION FEES\*

Forum Participant March 4-6	\$160*	\$ _____
Non Sponsoring Exhibitor	\$100	\$ _____
(In addition to Participant Registration)		
Optional TCMA Field Trip on March 7 at 9AM	\$35	\$ _____
Student**	\$0	
Spouse or Student Lunch March 4	\$18	\$ _____
Spouse or Student Lunch March 5	\$18	\$ _____
Spouse or Student Lunch March 6	\$18	\$ _____

\* Forum Registration fee includes: admission to all exhibits and sessions; breaks; evening reception 3/4; luncheons; and one copy of proceedings and edited discussions to be delivered after the forum.

\*\*Students wanting to attend sessions will be admitted on a space available basis. They must register and have proof of student status. They will not be entitled to lunches or breaks.

\_\_\_\_ DIETARY RESTRICTIONS (Please check here and attach a short description)

#### TOTAL AMOUNT ENCLOSED

\$ \_\_\_\_\_

(U.S. Funds Only by Check, Purchase Order, or major credit card)

Make Checks Payable to: **Bat Conservation International**

MAJOR CREDIT CARD: \_\_\_\_\_ Visa \_\_\_\_\_ Master Card \_\_\_\_\_ Discover \_\_\_\_\_  
Account # \_\_\_\_\_ Expiration Date \_\_\_\_\_  
Authorized Signature \_\_\_\_\_

REGISTRATION FEES WILL NOT BE REFUNDED ON REQUESTS RECEIVED AFTER 2/10/2002

Direct Registration Questions to Jim Kennedy (512) 327-9721; FAX (512) 327-9724; E-MAIL

[jkennedy@batcon.org](mailto:jkennedy@batcon.org)

MAIL TO: **BAT GATE DESIGN FORUM, BAT CONSERVATION INTERNATIONAL,  
P. O. BOX 162603, AUSTIN, TX 78716**

**BAT GATE DESIGN:  
A TECHNICAL INTERACTIVE FORUM  
AUSTIN, TEXAS  
MARCH 4-6, 2002**

**LODGING INFORMATION**

**Red Lion Hotel  
6121 N. I-35  
Austin, TX 78758  
(512) 323-5466  
FAX (512) 371-5269  
1-800-RED LION**

Reservation on the Internet Red Lion Hotel Web Site: [www.redlion.com](http://www.redlion.com)

**RATES:**

**GROUP RATE:**   \$70.00 Single Occupancy  
                          \$110.00 Double Occupancy

**WHEN MAKING RESERVATIONS PLEASE REFER TO: BAT GATE DESIGN FORUM**

**Participants must place their Reservations with the Hotel on or before FEBRUARY 10, 2002**  
Lodging is the responsibility of each participant.

**AIRPORT SHUTTLE SERVICE is available. Call Theresa Campos (512) 371-5243 with your departure and arrival times to arrange for the shuttle.**

**EXHIBITOR INFORMATION**

A limited number of spaces are available in the break area for the exhibit of applicable research projects, professional organizations, or commercial suppliers. Special needs beyond those listed below must be pre-arranged with the Theresa Campos at the Red Lion Hotel Sales Department (512) 371-5243; FAX (512) 371-5269; e-mail at [tcampos@ccsi.com](mailto:tcampos@ccsi.com)

Cost: \$100 (In addition to one participant registration per exhibit)

*Exhibit space will be limited to an 8-foot area. First consideration will be given to the steering committee, presenters, and sponsors as described above. Second consideration will be given to other individuals; organizations, or agencies with a \$100 exhibit fee. Power requirements, tables, and other equipment must be requested in advance. No telephone lines will be available. Further questions should be directed to Jim Kennedy, Bat Conservation International, at 512-327-9721 or [jkennedy@batcon.org](mailto:jkennedy@batcon.org).*

TEXAS CAVE MANAGEMENT ASSOCIATION  
AUSTIN CAVE GATES  
FIELD TOUR  
MARCH 7, 2002

Following the conference, the Texas Cave Management Association will provide an opportunity on March 7th for conference attendees to visit some of the gated caves in the Austin area. They will take you to gates placed for:

- the protection of bats,
- the protection of endangered species,
- owner security, and/or
- protection from liability.

Experienced cave managers will be on site to answer questions and explain the construction, background, and history of each gate.

The tour will include a catered lunch, transportation, and a technical guidebook.

Busses or vans will leave from the Red Lion Inn at 9:00 AM and return by 5:00 PM.

Cost per individual is \$35.00